RESEARCH PROBLEM STATEMENT #RW-501

I – Problem Title
Investigating new and safer technology for performing pavement elevation surveys.

II – Research Problem Statement
New sensors and technologies are being developed that have the potential to make pavement elevation surveys safer and more productive. The total station currently is our most accurate way to measure pavement elevations but not always the safest. Can these new technologies replace the total station, provide more safety, and/or be more productive?

III – Objective
To develop safer and more productive methods of obtaining pavement elevations in high traffic volume areas without sacrificing accuracy. This research supports the Department's safety goals by finding new ways to reduce surveyors exposure to traffic.

IV – Background
Surveys field personnel measure XYZ positions on existing roadway surfaces to build a digital terrain model (DTM). The DTM is the basis of the new roadway design. Sometimes lanes or shoulders must be closed for surveyors to access safely work. A position on the roadway is required to be measured with a vertical accuracy of +/- 7mm (+/-0.023 ft). Caltrans uses total stations setup alongside the road or mounted in a Vangarde system to obtain this accuracy. These two methods, however safely performed, still have the potential for unforeseen accidents.

V – Statement of Urgency and Benefits
Survey personnel are exposed to traffic hazards producing whenever a design survey is required on heavy traffic areas. All Caltrans surveyors would benefit from reduced safety hazards and the public would benefit from reduced traffic delays for lane closures.

VI – Related Research

1. Fenske, Larry. Cost Comparison of Methods to Determine Pavement Elevations, Caltrans, 1997.
2. Fenske, Larry. Memorandum: Vertical Control for Photogrammetric Terrain Line Surveys. Caltrans, 1998.
3. Hussain, Mushtaq PhD, PE & Munjy, Riadh PhD, PE. GPS Controlled Photogrammetriy for Large Scale Mapping. New Technology & Research Program California Department of Transportation, 1999

VII – Deployment Potential
This research project will examine new technologies and make recommendations for equipment purchases. The results of this research will be used by surveyors throughout Caltrans.